# Quick setup guide

**Radar sensor for continuous level measurement of liquids**

## VEGAPULS 64

Two-wire 4 … 20 mA/HART

Document ID: 51462

# Contents



**Information:**
This quick setup guide enables quick setup and commissioning of your instrument.

You can find supplementary information in the corresponding, more detailed Operating Instructions Manual as well as the Safety Manual that comes with instruments with SIL qualification. These manuals are available on our homepage.

**Operating instructions VEGAPULS 64 - Two-wire 4 … 20 mA/ HART: Document-ID 51141**
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# 1 For your safety

## 1.1 Authorised personnel

All operations described in this documentation must be carried out only by trained, qualified personnel authorised by the plant operator.

During work on and with the device, the required personal protective equipment must always be worn.

## 1.2 Appropriate use

VEGAPULS 64 is a sensor for continuous level measurement.

You can find detailed information about the area of application in chapter " *Product description*".

Operational reliability is ensured only if the instrument is properly used according to the specifications in the operating instructions manual as well as possible supplementary instructions.

## 1.3 Warning about incorrect use

Inappropriate or incorrect use of this product can give rise to application-specific hazards, e.g. vessel overfill through incorrect mounting or adjustment. Damage to property and persons or environmental contamination can result. Also, the protective characteristics of the instrument can be impaired.

## 1.4 General safety instructions

This is a state-of-the-art instrument complying with all prevailing regulations and directives. The instrument must only be operated in a technically flawless and reliable condition. The operator is responsible for the trouble-free operation of the instrument. When measuring aggressive or corrosive media that can cause a dangerous situation if the instrument malfunctions, the operator has to implement suitable measures to make sure the instrument is functioning properly.

The safety instructions in this operating instructions manual, the national installation standards as well as the valid safety regulations and accident prevention rules must be observed by the user.

For safety and warranty reasons, any invasive work on the device beyond that described in the operating instructions manual may be carried out only by personnel authorised by the manufacturer. Arbitrary conversions or modifications are explicitly forbidden. For safety reasons, only the accessory specified by the manufacturer must be used.

To avoid any danger, the safety approval markings and safety tips on the device must also be observed.

The low transmitting power of the radar sensor is far below the internationally approved limits. No health impairments are to be expected with intended use. The band range of the measuring frequency can be found in chapter " *Technical data*".

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## 1.5 EU conformity

The device fulfils the legal requirements of the applicable EU directives. By affixing the CE marking, we confirm the conformity of the instrument with these directives.

The EU conformity declaration can be found on our homepage.

## 1.6 NAMUR recommendations

NAMUR is the automation technology user association in the process industry in Germany. The published NAMUR recommendations are accepted as the standard in field instrumentation.

The device fulfils the requirements of the following NAMUR recommendations:

- NE 21 – Electromagnetic compatibility of equipment
- NE 43 – Signal level for fault information from measuring transducers
- NE 53 – Compatibility of field devices and display/adjustment components
- NE 107 – Self-monitoring and diagnosis of field devices

For further information see www.namur.de.

## 1.7 Radio license for Europe

The instrument was tested according to the latest issue of the following harmonized standards:

- EN 302372 - Tank Level Probing Radar
- EN 302729 - Level Probing Radar

It is hence approved for use inside and outside closed vessels in countries of the EU.

Use is also approved in EFTA countries, provided the respective standards have been implemented.

For operation inside of closed vessels, points a to f in annex E of EN 302372 must be fulfilled.

For operation outside of closed vessels, the following conditions must be fulfilled:

- The instrument must be stationary mounted and the antenna directed vertically downward
- The instrument may only be used outside closed vessels in the version with G1½ or 1½ NPT thread with integrated horn antenna.
- The mounting location must be at least 4 km away from radio astronomy stations, unless special permission was granted by the responsible national approval authority
- When installed within 4 to 40 km of a radio astronomy station, the instrument must not be mounted higher than 15 m above the ground.

A list of the respective radio astronomy stations can be found in chapter "*Appendix*" of the operating instructions.

## 1.8 Environmental instructions

Protection of the environment is one of our most important duties. That is why we have introduced an environment management system with the goal of continuously improving company environmental protection. The environment management system is certified according to DIN EN ISO 14001.

Please help us fulfil this obligation by observing the environmental instructions in this manual:

- Chapter " *Packaging, transport and storage*"
- Chapter " *Disposal*"

# 2 Product description

## 2.1 Configuration

**Type label**

The type label contains the most important data for identification and use of the instrument:


*Fig. 1: Layout of the type label (example)*

1 *Instrument type, product code*
2 *Field for approvals*
3 *Technical data*
4 *Data matrix code for VEGA Tools app*
5 *Reminder to observe the instrument documentation*

**Serial number - Instrument search**

The type label contains the serial number of the instrument. With it you can find the following instrument data on our homepage:

- Product code (HTML)
- Delivery date (HTML)
- Order-specific instrument features (HTML)
- Operating instructions and quick setup guide at the time of shipment (PDF)
- Order-specific sensor data for an electronics exchange (XML)
- Test certificate (PDF) - optional

Move to " www.vega.com" and enter in the search field the serial number of your instrument.

Alternatively, you can access the data via your smartphone:

- Download the VEGA Tools app from the " *Apple App Store*" or the " *Google Play Store*"
- Scan the DataMatrix code on the type label of the instrument or
- Enter the serial number manually in the app

# 3 Mounting

## 3.1 Mounting preparations, mounting strap

The mounting strap is supplied unassembled (optionally) as accessory part of the plastic horn antenna and must be screwed to the sensor before setup with three hexagon socket screws M5 x 10 and spring washers. Max. torque, see chapter " *Technical data*". Required tools: Allen wrench size 4.

There are two different variants of screwing the strap to the sensor, see following illustration:

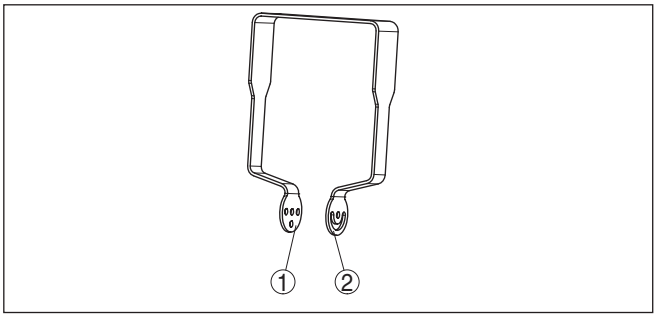


*Fig. 2: Mounting strap for screwing to the sensor*

*1 For angle of inclination in steps*
*2 For angle of inclination, infinitely variable*

Depending on the selected variant, the sensor can be rotated in the strap:

- Single chamber housing
  - Angle of inclination in three steps 0°, 90° and 180°
  - Angle of inclination 180°, infinitely variable
- Double chamber housing
  - Angle of inclination in two steps 0° and 90°
  - Angle of inclination 90°, infinitely variable

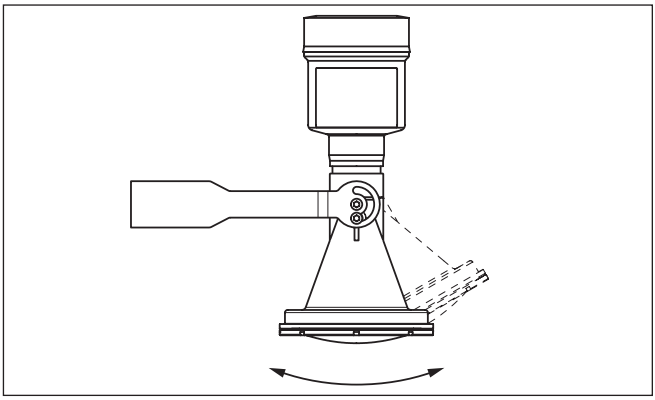

*Fig. 3: Adjustment of the angle of inclination*

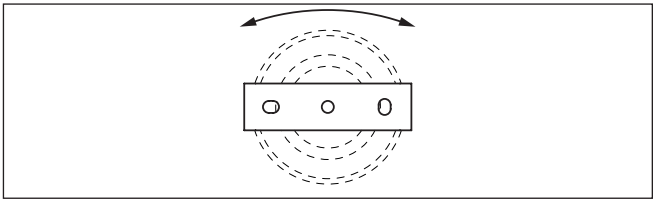

*Fig. 4: Turning by fastening in the centre*

## 3.2 Mounting instructions

**Polarisation**

Radar sensors for level measurement emit electromagnetic waves. The polarization is the direction of the electrical component of these waves.

The polarization direction is marked by a nose on the housing, see following drawing:

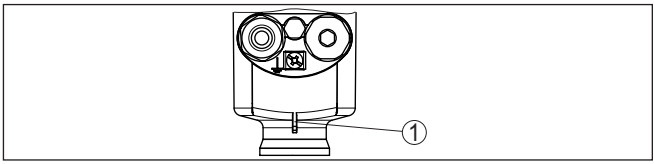


*Fig. 5: Position of the polarisation*

*1 Nose for marking the direction of polarisation*

**Note:**
Turning the housing changes the polarisation and thus the effect of false echoes on the measured value.

In order to avoid a change in the metrological properties, observe the position of the polarisation during installation or in the case of subsequent changes.

**Installation position**

When mounting the device, keep a distance of at least 200 mm (7.874 in) from the vessel wall. If the device is installed in the center of dished or round vessel tops, multiple echoes can arise. However, these can be suppressed by an appropriate adjustment (see chapter " *Setup*").

If you cannot maintain this distance, you should carry out a false signal suppression during setup. This applies particularly if buildup on the vessel wall is expected. In such cases, we recommend repeating the false signal suppression at a later date with existing buildup.

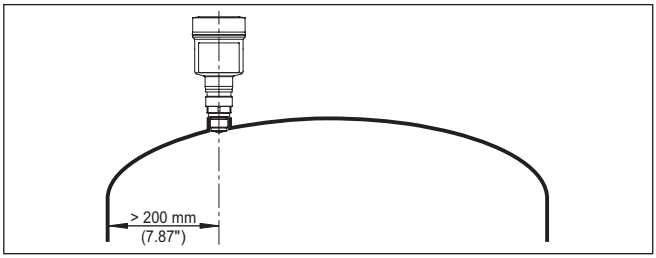


*Fig. 6: Mounting of the radar sensor on round vessel tops*

In vessels with conical bottom it can be advantageous to mount the device in the centre of the vessel, as measurement is then possible down to the bottom.

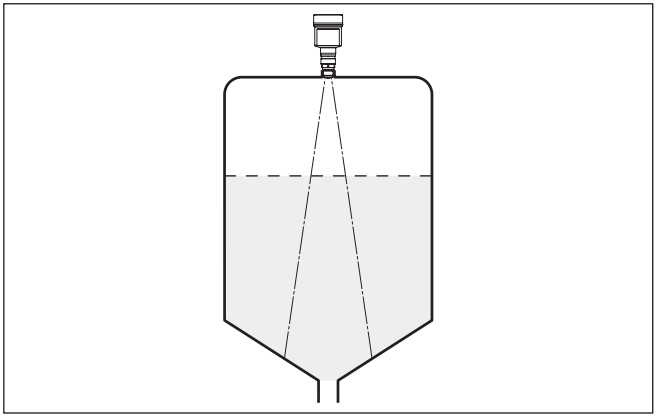

*Fig. 7: Mounting of the radar sensor on vessels with conical bottom*

# 4 Connecting to power supply

## 4.1 Connecting

**Connection technology**

The voltage supply and signal output are connected via the spring-loaded terminals in the housing.

Connection to the display and adjustment module or to the interface adapter is carried out via contact pins in the housing.

**Information:**
The terminal block is pluggable and can be removed from the electronics. To do this, lift the terminal block with a small screwdriver and pull it out. When reinserting the terminal block, you should hear it snap in.

**Connection procedure**

Proceed as follows:

1. Unscrew the housing lid
2. If a display and adjustment module is installed, remove it by turning it slightly to the left
3. Loosen compression nut of the cable gland and remove blind plug
4. Remove approx. 10 cm (4 in) of the cable mantle, strip approx. 1 cm (0.4 in) of insulation from the ends of the individual wires
5. Insert the cable into the sensor through the cable entry

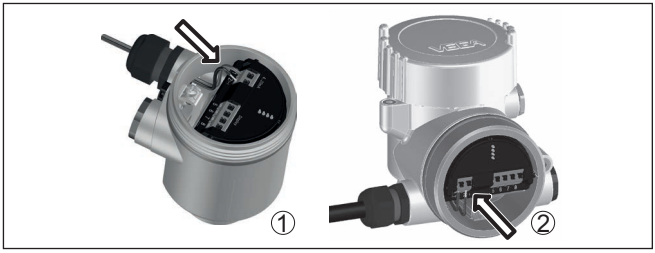


*Fig. 8: Connection steps 5 and 6*

*1 Single chamber housing*
*2 Double chamber housing*

6. Insert the wire ends into the terminals according to the wiring plan

**Note:**
Solid cores as well as flexible cores with wire end sleeves are inserted directly into the terminal openings. In case of flexible cores without end sleeves, press the terminal from above with a small screwdriver, the terminal opening is then free. When the screwdriver is released, the terminal closes again.

7. Check the hold of the wires in the terminals by lightly pulling on them
8. Connect the shielding to the internal ground terminal, connect the external ground terminal to potential equalisation

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9. Tighten the compression nut of the cable entry gland. The seal ring must completely encircle the cable
10. Reinsert the display and adjustment module, if one was installed
11. Screw the housing lid back on

The electrical connection is finished.

## 4.2 Wiring plan, single chamber housing

The following illustration applies to the non-Ex as well as to the Ex-ia version.

**Electronics and connection compartment**

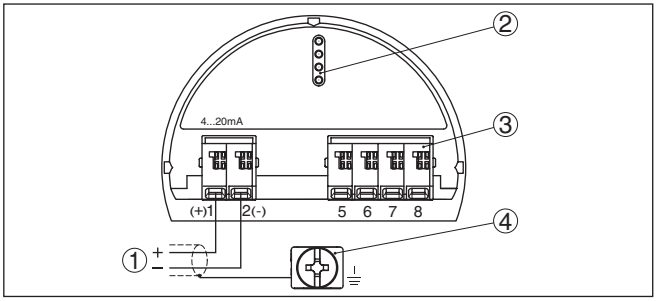



*Fig. 9: Electronics and connection compartment - single chamber housing*

*1 Voltage supply, signal output*
*2 For display and adjustment module or interface adapter*
*3 For external display and adjustment unit*
*4 Ground terminal for connection of the cable screening*

# 5 Set up with the display and adjustment module

## 5.1 Insert display and adjustment module

The display and adjustment module can be inserted into the sensor and removed again at any time. You can choose any one of four different positions - each displaced by 90°. It is not necessary to interrupt the power supply.

Proceed as follows:

1. Unscrew the housing lid
2. Place the display and adjustment module on the electronics in the desired position and turn it to the right until it snaps in.
3. Screw housing lid with inspection window tightly back on

Disassembly is carried out in reverse order.

The display and adjustment module is powered by the sensor, an additional connection is not necessary.


*Fig. 10: Installing the display and adjustment module in the electronics compartment of the single chamber housing*

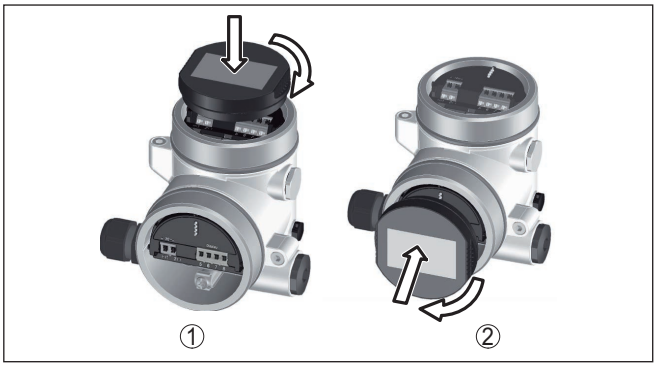


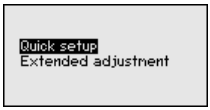

*Fig. 11: Installing the display and adjustment module in the double chamber housing*

*1 In the electronics compartment*
*2 In the connection compartment*

**Note:**
If you intend to retrofit the instrument with a display and adjustment module for continuous measured value indication, a higher lid with an inspection glass is required.

## 5.2 Parameter adjustment - Quick setup

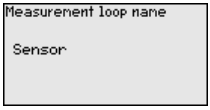
To quickly and easily adapt the sensor to the application, select the menu item " *Quick setup*" in the start graphic on the display and adjustment module.



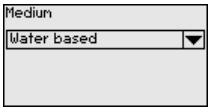

**Quick setup process**

Select the individual menu items with the ***[->]*** key. Carry out the steps in the below sequence.

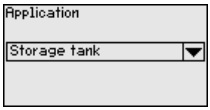
**1. Measurement loop name**
In the first menu item you assign a suitable measurement loop name. Permitted are names with max. 19 characters.



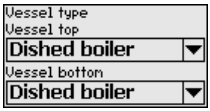

**2. Medium**
In this menu item you select the medium. The selection comprises liquids with different properties.



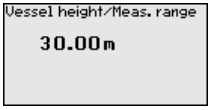
**3. Application**
In this menu item you determine the application.




**4. Vessel shape**
In this menu item you specify the for of the vessel bottom and top.

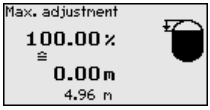



**5. Vessel height/Measuring range**
In this menu item you enter the height of the vessel and hence the active measuring range.



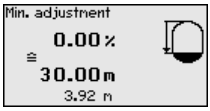

**6. Max. adjustment**
In this menu item you carry out the max. adjustment.

Enter the measuring distance for 100 % filling.




**7. Min. adjustment**
In this menu item you carry out the min. adjustment.

Enter the measuring distance for 0 % filling.




**8. Termination**
" *Quick setup terminated successfully*" is displayed briefly.

**Information:**
The echo curve of setup was stored automatically during the quick setup.

The quick setup is finished.

The return to the measured value indication is carried out through the ***[->]*** or ***[ESC]*** keys or automatically after 3 s

**Extended adjustment**

The menu " *Extended adjustment*" is available for further settings. Important functions are described in the following chapter. You can find a

complete description of all functions of the " *Extended adjustment*" in the operating instructions manual of VEGAPULS 64.

## 5.3 Menu overview

**Setup**

| Menu item | Parameter | Default setting |
|---|---|---|
| Measurement loop name | | Sensor |
| Units | | Distance in m<br>Temperature in °C |
| Application | Medium | Water based |
| | Application | Storage tank |
| | Vessel top/Vessel bottom | Dished form/Dished form |
| | Vessel height/ Measuring range | 30 m |
| Adjustment | Max. adjustment | 0,000 m(d)<br>100.00 % |
| | Min. adjustment | 30 m<br>0.00 % |
| Damping | Integration time | 0.0 s |
| Current output | Current output - Mode | Output characteristics<br>4 … 20 mA<br>Reaction when malfunctions occur<br>≤ 3.6 mA |
| | Current output - Min./Max. | 3.8 mA<br>20.5 mA |
| Lock adjustment | | Released |

**Display**

| Menu item | Default setting |
|---|---|
| Menu language | Order-specific |
| Displayed value 1 | Filling height in % |
| Displayed value 2 | Electronics temperature in °C |
| Backlight | Switched on |

**Diagnostics**

| Menu item | Parameter | Default setting |
|---|---|---|
| Device status | | - |
| Peak value indicator | Distance | - |
| | Measurement reliability | - |

| Menu item | Parameter | Default setting |
|---|---|---|
| Peak values, additional | Temperature | - |
| Curve display | Echo curve | - |
| | False signal suppression | - |
| Simulation | | Percent |
| Echo curve memory | | Percent |

### Additional adjustments

| Menu item | Parameter | Default setting |
|---|---|---|
| Date/Time | | Actual date/Actual time |
| Reset | | - |
| Copy instrument settings | | - |
| Scaling | Scaling size | Volume in l |
| | Scaling format | 0 % corresponds to 0 l<br>100 % corresponds to 0 l |
| Current output 1 | Current output - Meas. variable | Lin. percent - Level |
| | Current output - Adjustment | 0 … 100 % correspond to 4 … 20 mA |
| Current output 2 | Current output - Meas. variable | Lin. percent - Level |
| | Current output - Adjustment | 0 … 100 % correspond to 4 … 20 mA |
| False signal suppression | | - |
| Linearisation | | Linear |
| HART mode | | Address 0 |
| Special parameters | | - |

### Info

| Menu item | Parameter |
|---|---|
| Device name | Device name |
| Instrument version | Hardware and software version |
| Factory calibration date | Date |
| Sensor characteristics | Order-specific characteristics |

# 6 Set up with smartphone/tablet, PC/ notebook via Bluetooth

## 6.1 Preparations

**Activate Bluetooth**

Make sure that the Bluetooth function of the display and adjustment module is activated. For this, the switch on the bottom side must be set to "*On*".

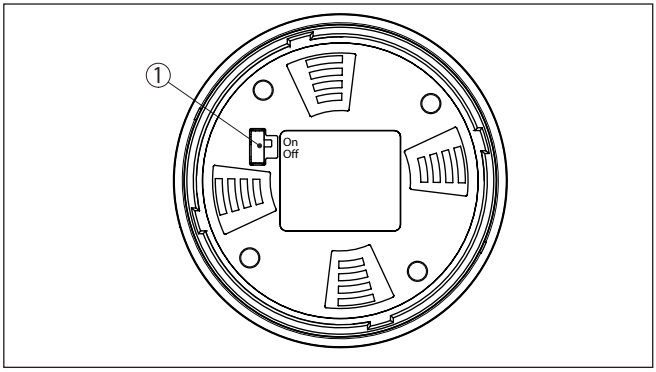



*Fig. 12: Activate Bluetooth*

*1 Switch*
*On = Bluetooth active*
*Off = Bluetooth not active*

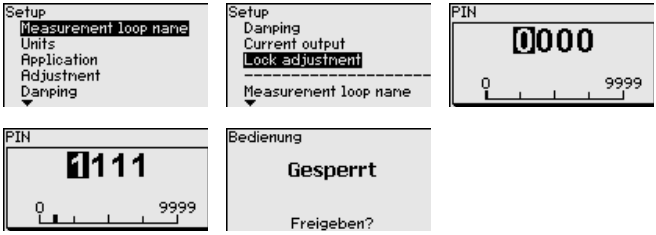
**Change sensor PIN**

The security concept of Bluetooth operation absolutely requires that the default setting of the sensor PIN be changed. This prevents unauthorized access to the sensor.

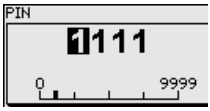
The default setting of the sensor PIN is "**0000**". First of all you have to change the sensor PIN in the adjustment menu of the sensor, e.g. to "**1111**":

1. Go to setup via the extended operation


2. Lock operation by changing sensor PIN




3. Enable operation again by entering the sensor PIN once more





Sensor adjustment via the display/adjustment module or PACTware/DTM by means of VEGACONNECT is thus released again. For access (authentication) with Bluetooth, the changed PIN is still effective.

**Note:**
Bluetooth access can only be established if the current sensor PIN differs from the default setting " **0000**". It is possible both when the adjustment is unlocked and when it is locked.

## 6.2 Connecting

**Preparations**

**Smartphone/Tablet**
Start the adjustment app and select the function "Setup". The smartphone/tablet searches automatically for Bluetooth-capable instruments in the area.

**PC/Notebook**
Start PACTware and the VEGA project assistant. Select the device search via Bluetooth and start the search function. The device automatically searches for Bluetooth-capable devices in the vicinity.

**Connecting**

The message " *Instrument search running*" is displayed. All devices found are listed in the operating window. The search is automatically continued continuously.

Select in the device list the requested device. The message " *Connecting*" is displayed.

**Authenticate**

For the first connection, the operating device and the sensor must authenticate each other. After successful authentication, the next connection functions without authentication.

For authentication, enter in the next menu window the 4-digit sensor PIN.

## 6.3 Sensor parameter adjustment

The sensor parameterization is carried out via the adjustment app on the smartphone/tablet or the DTM on the PC/notebook.

## App view

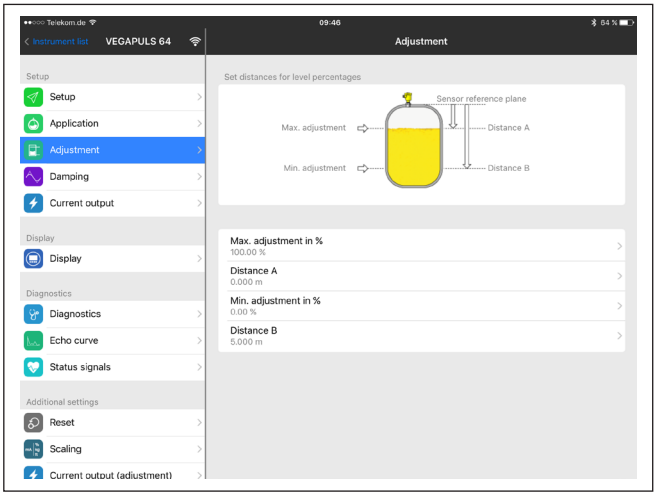



*Fig. 13: Example of an app view - Setup sensor adjustment*

# 7 Supplement

## 7.1 Technical data

**Note for approved instruments**

The technical data in the respective safety instructions which are included in delivery are valid for approved instruments (e.g. with Ex approval). These data can differ from the data listed herein, for example regarding the process conditions or the voltage supply.

All approval documents can be downloaded from our homepage.

**Electromechanical data - version IP66/IP67 and IP66/IP68 (0.2 bar)**

Options of the cable entry

- Cable entry — M20 x 1.5; ½ NPT
- Cable gland — M20 x 1.5; ½ NPT (cable ø see below table)
- Blind plug — M20 x 1.5; ½ NPT
- Closing cap — ½ NPT

| Material cable gland | Material seal insert | Cable diameter | | | | |
|---|---|---|---|---|---|---|
| | | 4.5 … 8.5 mm | 5 … 9 mm | 6 … 12 mm | 7 … 12 mm | 10 … 14 mm |
| PA | NBR | - | ● | ● | - | ● |
| Brass, nickel-plated | NBR | ● | ● | ● | - | - |
| Stainless steel | NBR | - | ● | ● | - | ● |

Wire cross-section (spring-loaded terminals)

- Massive wire, stranded wire — 0.2 … 2.5 mm² (AWG 24 … 14)
- Stranded wire with end sleeve — 0.2 … 1.5 mm² (AWG 24 … 16)

**Voltage supply**

| | |
|---|---|
| Operating voltage $U_B$ | 12 … 35 V DC |
| Operating voltage $U_B$ with lighting switched on | 18 … 35 V DC |
| Reverse voltage protection | Integrated |
| Permissible residual ripple | |
| – for 12 V < $U_B$ < 18 V | ≤ 0.7 $V_{eff}$ (16 … 400 Hz) |
| – for 18 V < $U_B$ < 35 V | ≤ 1 $V_{eff}$ (16 … 400 Hz) |
| Load resistor | |
| – Calculation | ($U_B$ - $U_{min}$)/0.022 A |
| – Example - $U_B$= 24 V DC | (24 V - 12 V)/0.022 A = 545 Ω |

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